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but the great production has compelled such advances in refining methods as to make it reasonably certain that California will in the future yield good refined products, including lubricating and illuminating oils.

THE results of the latest tests on reinforced concrete, conducted in the College of Engineering of the University of Wisconsin, have just been published by the university. In this bulletin suggestions are made as to the most economical mixture of cement, sand and gravel in making the concrete. It also contains data concerning the strength of different forms of reinforced columns. The loads that may be safely used in designing reinforced concrete columns and the strength of columns resting upon small footings are also dealt with, and conclusions given as to the behavior of the latter. The work in this field has been in progress for about ten years at the University of Wisconsin and the bulletin just published supplements one published about three years ago.

#### UNIVERSITY AND EDUCATIONAL NEWS

THE directors of Bryn Mawr College have formally accepted the bequest of \$750,000, made by the will of Emma Carola Woerishoffer, of New York, who was killed in an automobile accident last summer. The whole sum has been constituted as a permanent endowment fund, to be named the Emma Carola Woerishoffer Endowment Fund. A scholarship has been founded at the college in memory of Miss Anna Hallowell, of Philadelphia, by her family. The interest of the \$2,500 which is given will be used as a scholarship for an undergraduate student each year.

THE sum of \$50,000 has been given to Beloit College by Mrs. Rufus H. Sage, of Chicago, and will be applied to the endowment of the chair of English literature. The total endowment of the college—in active, interest-bearing securities—is now increased to \$1,251,000, aside from the value of the buildings.

THE University of California announces the establishment by Mr. F. M. Smith, of Oakland, California, of a research fellowship for

investigation of certain problems incident to the growth of cities in the San Francisco Bay region. Attention is to be directed especially to questions relating to the development of parks, playgrounds and other community interests demanding particular consideration of space available for growth. The stipend of the fellowship is \$1,000 per annum, and an additional sum of \$500 annually is provided for expenses of the investigation.

BUILDING operations on the new auditorium of the University of Michigan, made possible by Regent Hill's bequest of \$200,000, will soon be under way. The site has been chosen with a view to commanding a convenient approach when the campus extension plans shall have been carried out. The auditorium, with its two galleries, will have a seating capacity of 5,500.

M. GEORGES LEYGUES has given 25,000 francs to the University of Paris for the new Institute of Chemistry.

THE faculty of the College of Arts and Sciences of the University of Maine has made a change in the requirements for the B.A. degree, abolishing the requirement of ten hours in the classical department. Hereafter, neither Latin nor Greek will be required for admission to the college, nor for the B.A. degree. A broad group system has been adopted within which a student, under the advice of his major instructor and with certain restrictions, may elect his own course.

THE board of trustees of the College of the City of New York has authorized the opening of the college courses to mature and properly qualified applicants who do not wish to pursue the full curriculum leading to a degree. In the department of chemistry special courses are offered in analytical, industrial, organic, physical and electrochemistry with opportunities for investigation. Full particulars may be had by addressing Professor Charles Baskevill, College of the City of New York.

ANNOUNCEMENT is made that the formal inauguration of Dr. John Grier Hibben as president of Princeton University will take place early in May. Dr. Hibben will continue to

give his course of lectures on philosophy under the auspices of the Graduate School, and it is expected that he will continue to give at least one course to the undergraduates.

DR. HENRY LOUIS SMITH, president of Davidson College, has been elected president of Washington and Lee University.

MR. H. R. FULTON, associate professor of botany in the Pennsylvania State College, has been elected to the professorship of botany and vegetable pathology in North Carolina College of Agriculture and Mechanical Arts.

BEVERLY W. KUNKLE, now instructor in the Yale Sheffield Scientific School, has been appointed to the chair of zoology at Beloit College to assume his duties in September.

IN Macdonald College, Ste. Anne de Bellevue, Quebec, the following have been appointed to fill the positions named: *Lecturer in Biology*: W. P. Fraser, M.A., Pictou, N. S. *Lecturer in Poultry and Poultry Management*: M. A. Jull, B.S.A., at present Live Stock Commissioner of the Province of British Columbia. *Assistant in Animal Husbandry*: W. J. Reid, B.S.A. *Assistant in Biology*: Peter I. Bryce.

#### DISCUSSION AND CORRESPONDENCE

##### "PHENOTYPE" AND "CLONE"

IN calling attention to the frequent misuse of the words "genotype" and "pure line," Jennings says<sup>1</sup> that the word "phenotype" "designates a group of organisms which in outward appearance seem to belong to one type, although in hereditary constitution they may actually differ greatly. *Genotype*, in Johannsen's usage, is not directly contrasted with phenotype," etc.

As I have also used "phenotype" with the meaning indicated by Jennings, I did not recognize the fundamental misconception involved in the quotation given above, when I wrote my note<sup>2</sup> in response to the article from which this quotation is taken. My attention has been called to this point by Dr. Johannsen, and it seems best to set the matter straight at once, in connection with the at-

tempt made by Jennings and seconded by myself, to restrict to their original meanings, the other terms introduced by Johannsen. "Phenotype" and "genotype," when both are rightly used, are *contrasted terms*, both being *abstractions* referring to the *type* to which an individual or group of individuals belongs, and *not to the group of individuals* belonging to that type. To illustrate the use of "phenotype" in its correct sense, reference may be made to the  $F_2$  of a Mendelian hybrid. When an  $F_1$  hybrid whose genotypic constitution may be represented by the formula,  $XXAaBb$ , is self-fertilized or crossed with another individual having the same formula, there will be possessed by different individuals among the offspring nine different genotypes, but only four different phenotypes. The nine genotypes may be represented by the formulæ:  $XXAABB$ ,  $XXAABb$ ,  $XXAaBB$ ,  $XXAAbb$ ,  $XXaaBB$ ,  $XXAaBb$ ,  $XXAabb$ ,  $XXaaBb$  and  $XXaabb$ . The four phenotypes may in similar manner be indicated by the formulæ:  $XAB$ ,  $XAb$ ,  $XaB$  and  $Xab$ . As the "phenotype" is the "type of the phenomenon"—the type of that which actually appears—there must always be as many distinguishable groups of individuals as there are phenotypes; hence, the readiness with which the word "phenotype" has been misinterpreted and applied to the group of apparently equal individuals instead of the constitution or assemblage of characteristics with respect to which such a group of individuals is apparently homogeneous.

There is at present no satisfactory word universally applicable to all groups of individuals possessing the same phenotype—the concept for which the word "phenotype" itself has been misused. The words "species" and "sub-species" used by taxonomists are applicable, at least in some cases, to groups of such phenotypically equal individuals, but no one would think at present of applying either of these words to all the numerous slightly differentiated groups which the geneticist is now able to distinguish and with which he is obliged to work. A short and appropriate word for all such groups of individuals,

<sup>1</sup> SCIENCE, December 15, 1911.

<sup>2</sup> SCIENCE, January 5, 1912.